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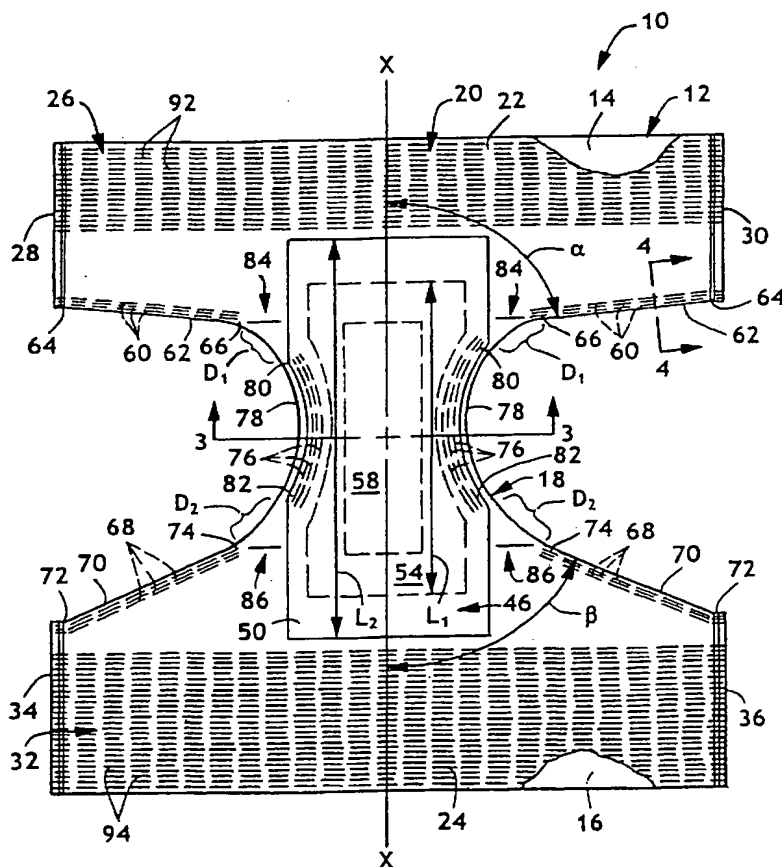
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- (71) Applicant: **KIMBERLY-CLARK WORLDWIDE, INC.** [US/US]; 401 N. Lake Street, Neenah, WI 54956 (US).
- (72) Inventors: **CAZZATO, Tim, Richard**; 1423 Violet Street, Carol Stream, IL 60188 (US). **DATTA, Paul, Joseph**; N2005 Mayflower Road, Appleton, WI 54913 (US). **GROSS, Jacqueline, Ann**; 1028 W. Cecil Street, Neenah, WI 54956 (US). **VENTURINO, Michael, Barth**; 2124 Omega Drive, Appleton, WI 54915 (US). **WEYENBERG, Steven, Lambert**; N2353 Maloney Road, Kaukauna, WI 54130 (US). **BRUNNER, Michael, Scott**; 310 Arbor Creek Trail, Roswell, GA 30076 (US).
- (74) Agents: **CONNELLY, Thomas, J. et al.**; Kimberly-Clark Worldwide, Inc., 401 N. Lake Street, Neenah, WI 54956 (US).
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(54) Title: **DISPOSABLE ABSORBENT UNDERPANTS**



(57) Abstract: The disposable underpants include an outer cover and an inner liner attached to the outer cover. An absorbent pad secured to the crotch portion, includes a liquid-permeable cover, a liquid impermeable baffle and an absorbent layer positioned therebetween. A first pair of leg elastics is secured between the outer cover and the inner liner at the front portion such that each of the first pair of leg elastics is positioned adjacent to one of the pair of leg openings. A second pair of leg elastics is secured between the outer cover and the inner liner at the back portion such that each of the second pair of leg elastics is positioned adjacent to one of the pair of leg openings. A third pair of leg elastics is secured between the liquid-permeable cover and the liquid impermeable baffle such that each of the third pair of leg elastics is positioned adjacent to one of the pair of leg openings intermediate one of the first and second pairs of leg elastics. Each of the third pair of leg elastics is separated from at least one of the first and second leg elastics by a gap. The first, second and third pairs of leg elastics allow gathers to form about each of the leg openings to prevent leakage of body fluid from the underpants.

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DISPOSABLE ABSORBENT UNDERPANTS

Field of the Invention

This invention relates to disposable absorbent underpants for containing body fluid. More specifically, this invention relates to disposable absorbent underpants for containing at least 100 grams of urine.

Background of the Invention

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Disposable underpants have been commercially available for some time for use by infants and toddlers as diapers and training pants. Disposable underpants have also been available for use by adults suffering from incontinence. A number of such underpants have used elastics around the leg openings to form gathers so as to prevent leakage of body fluid from the underpants. When the elastic completely encircles each of the leg openings, it has been found that pressure marks can be left on the thighs of the wearer should the elastic be too tight. It has also been found that when three or more discrete sections of elastics are secured around each leg opening that at the points where the elastics overlap one another, leakage can occur. The overlap of two sections of elastics can also create a bump or hump that can cause irritation and discomfort to the wearer of the underpants.

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Now, disposable underpants have been developed which utilize two or more discrete elastic sections that are spaced apart from one another and are positioned about each leg opening. Each discrete elastic section is separated from an adjacent section by a gap. The gaps formed between the adjacent sections assures that the elastics will not overlap one another even when the elastics contract and gather the material to which they are secured. By eliminating overlaps of the elastics around each leg opening, one can prevent the leakage of body fluid from the underpants.

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Summary of the Invention

Briefly, this invention relates to disposable absorbent underpants for containing body fluid. The disposable underpants include an outer cover having a front portion and a

back portion joined together by a crotch portion. An inner liner is attached to the outer cover. The inner liner has at least a front portion and a back portion and the front and back portions of the outer cover and the inner liner are connected together to form a waist opening and a pair of leg openings. An absorbent pad is secured to the crotch portion.

5 The absorbent pad includes a liquid-permeable cover, a liquid impermeable baffle and an absorbent layer positioned therebetween. A first pair of leg elastics is secured between the outer cover and the inner liner at the front portion such that each of the first pair of leg elastics is positioned adjacent to one of the pair of leg openings. A second pair of leg elastics is secured between the outer cover and the inner liner at the back portion such
10 that each of the second pair of leg elastics is positioned adjacent to one of the pair of leg openings. A third pair of leg elastics is secured between the liquid-permeable cover and the liquid impermeable baffle such that each of the third pair of leg elastics is positioned adjacent to one of the leg openings intermediate one of the first and second pairs of leg elastics. Each of the third pair of leg elastics is separated from at least one of the first and
15 second leg elastics by a gap. The first, second and third pairs of leg elastics allow gathers to form about each of the leg openings to prevent leakage of body fluid from the underpants. The underpants also contain waist elastic attached between the outer cover and the inner liner at the front and back portions. The waist elastics allow gathers to form about the waist opening to prevent leakage of body fluid from the underpants.

20 The general object of this invention is to provide disposable absorbent underpants for containing body fluid. A more specific object of this invention is to provide disposable absorbent underpants for containing at least 100 grams of urine.

Another object of this invention is to provide disposable absorbent underpants for an adult suffering from incontinence.

25 A further object of this invention is to provide disposable absorbent underpants at a reasonable cost that can prevent leakage of body fluid.

Still another object of this invention is to provide disposable absorbent underpants that are easy to manufacture.

30 Still further, an object of this invention is to provide disposable absorbent underpants that are more comfortable to wear.

Other objects and advantages of the present invention will become more apparent to those skilled in the art in view of the following description and the accompanying drawings.

Brief Description of the Drawings

Fig. 1 is a top view of disposable absorbent underpants having two cut-away sections showing an outer cover and a two piece inner liner and having three discrete pairs of leg elastics surrounding each leg opening which are separated from one another by a gap.

Fig. 2 is a perspective view of the disposable absorbent underpants when the front and back portions are joined together.

Fig. 3 is a cross-sectional view taken along line 3—3 of Fig. 1 showing the absorbent pad secured to the crotch portion of the outer cover.

Fig. 4 is a cross-sectional view taken along line 4—4 of Fig. 1 showing one of the first pair of leg elastics sandwiched between the outer cover and the inner liner.

Fig. 5 is a top view of disposable absorbent underpants having three cut-away sections showing an outer cover and an inner liner with coterminous edges and having three discrete pairs of elastics surrounding each leg opening which are separated from one another by a gap.

Fig. 6 is a cross-sectional view taken along line 6—6 of Fig. 5 showing the absorbent pad secured to the crotch portion of the inner liner.

Detailed Description of the Preferred Embodiments

Referring to Fig. 1, disposable absorbent underpants 10 are shown in a flat configuration before being formed into a tubular product. The tubular product is depicted in Fig. 2. The underpants 10 is capable of absorbing and containing body fluid, especially urine. The underpants 10 have a longitudinal centerline X—X. The underpants 10 are manufacture and sold as a complete garment and are designed to be pulled up about the torso of an adult who is suffering from incontinence. However, the underpants 10 could be dimensioned to be a diaper designed to be worn by an infant or be a training pant designed to be worn by a toddler. Preferably, the underpants 10 is an adult incontinent article that can be used day or night to absorb and contain urine.

The disposable underpants 10 is constructed of an outer cover 12 having a front portion 14 and a back portion 16 joined together by a crotch portion 18. The outer cover 12 is located away from the body of the wearer in use. The outer cover 12 can be a single piece of material as shown or it can be made up of two or more separate pieces of material that are joined together. The outer cover 12 should be formed from a soft and flexible material and it can be either liquid-permeable or liquid impermeable. Preferably,

the outer cover 12 is liquid impermeable. A suitable material for the outer cover 12 can be made from natural or synthetic fibers and/or films. Examples of natural fibers include cellulose wood fibers and cotton fibers. Examples of synthetic fibers include rayon fibers, polyester fibers, and polypropylene fibers. When a film is utilized, a thermoplastic film
5 formed from a polyolefin, such as polypropylene or polyethylene works well. A combination of natural and synthetic materials can also be used to construct the outer cover 12. The outer cover 12 can also be formed from a woven or a non-woven web or sheet such as a spunbond, a meltblown or a bonded-carded web.

The disposable underpants 10 also contain an inner liner 20. The inner liner 20 is
10 located toward the body of the wearer in use. The inner liner 20 has a front portion 22 and a back portion 24. The inner liner 20 can be attached or secured to the outer cover 12 by an adhesive, by sewing, by a pressure bond, by a thermal bond, by a pressure and thermal bond, or by another means known to those skilled in the art. The front portion 22 of the inner liner 20 is positioned above or over the front portion 14 of the outer cover 12
15 while the back portion 24 of the inner liner 20 is positioned above or over the back portion 16 of the outer cover 12. The combination of the two front portions 14 and 22 create a front waist portion 26 having distally spaced edges 28 and 30. The combination of the back portions 16 and 24 create a back waist portion 32 having distally spaced edges 34 and 36. The edges 28 and 30 of the front waist portion 26 are connected or sealed to the
20 edges, 34 and 36 respectively, of the back waist portion 32 to form a tubular configuration 38 adaptable to fit around the torso of a person, see Fig.2.

The front and back waist portions, 26 and 32 respectively, are secured together to form a pair of side seams or seals 35 and 37. The side seams 35 and 37 can be formed
25 using an ultrasonic bond, by using an adhesive, by using a pressure bond, by using a thermal bond, by using a combination of heat and pressure or by using another means known to those skilled in the art. The tubular configuration 38 has a waist opening 40 and a pair of leg opening 42 and 44. The underpants 10 is designed to fit snugly around the torso of an adult suffering from incontinence and is designed to contain body fluid, especially urine, discharged by the wearer.

30 Referring to Figs. 1-3, an absorbent pad 46 is shown being secured to the crotch portion 18 by an adhesive 48, see Fig. 3. The absorbent pad 46 includes a liquid-permeable cover 50, a liquid impermeable baffle 52 and an absorbent layer 54 positioned therebetween. The liquid-permeable cover 50 and the liquid impermeable baffle 52 are joined or secured together about their peripheries by a construction adhesive 56. The
35 absorbent layer 54 has a length L_1 , see Fig. 1, and a width W_1 , see Fig. 3, which are less than the length L_2 and the width W_2 of the absorbent pad 46. This means that the liquid-

permeable cover 50 and the liquid impermeable baffle 52 are larger in size than the absorbent layer 54 and both extend beyond the outer periphery of the absorbent layer 54. This is important because by forming the absorbent layer 54 such that it has a smaller overall size, any body fluid received by the absorbent layer 54 will not be able to flow or
5 wick outward to the outer edges of the absorbent pad 46. This feature will minimize and hopefully prevent the chance of fluid leakage from occurring. The absorbent layer 54 should have a width W_1 that is at least about 0.125 inches (about .32 mm) less than the width W_2 of the absorbent pad 46. Preferably, the absorbent layer 54 will have a width W_1 that is from between about 0.25 inches (about .64 mm) to about 1 inch (about 2.54mm)
10 less than the width W_2 of the absorbent pad 46. More preferably, the absorbent layer 54 will have a width W_1 that is from between about 0.375 inches (about .95 mm) to about 0.75 inches (about 1.9 mm) less than the width W_2 of the absorbent pad 46.

Referring to Fig. 3, one will notice that the crotch portion 18 of the outer cover 12 has a width W_3 and the width W_2 of the absorbent pad 46 is less than the width W_3 of the
15 crotch portion 18. The absorbent pad 46 should have a width W_2 that is at least about 0.125 inches (about .32 mm) less than the width W_3 of the crotch portion 18. Preferably, the width W_2 of the absorbent pad 46 is from between about 0.25 inches (about .32 mm) to about 1 inch (about 2.54 mm) less than the width W_3 of the crotch portion 18. More preferably, the absorbent pad 46 will have a width W_2 that is from between about 0.375
20 inches (about .95 mm) to about 0.75 inches (about 1.9 mm) less than the width W_3 of the crotch portion 18. The reason for this size difference is that the underpants 10 is primarily designed to absorb urine and it is desirable to confine the urine to the absorbent layer 54. The absorbent layer 54 has a width W_1 that is less than the width W_2 of the absorbent pad 46 and, in turn, the absorbent pad 46 has a width W_2 that is less than the width W_3 of the
25 crotch portion 18. This size difference assures that if any urine wicks to the longitudinal side edges of the absorbent layer 54 that it will still be spaced apart from the longitudinal side edges of the absorbent pad 46. In turn, the urine will be further away from the longitudinal side edges of the crotch portion 18 and therefore will not leak onto the wearer's clothing or skin.

30 The liquid-permeable cover 50 can be formed from a liquid-permeable material so as to allow body fluid which strikes the absorbent pad 46 to pass down into the absorbent layer 54. The liquid-permeable cover 50 can be formed from a non-woven web, a spunbond, a meltblown or a bonded-carded web composed of synthetic polymer filaments or fibers. Examples of synthetic materials include polypropylene, polyethylene, polyesters
35 and the like. The liquid-permeable cover 50 can also be formed from a perforated thermoplastic film. Other materials, which can also be utilized to form the cover 50,

include rayon and cotton. The liquid-permeable cover 50 can be treated with a surfactant to aid in transfer of the body fluid into the absorbent layer 54, if desired.

The liquid impermeable baffle 52 can be formed from a liquid impermeable material so as to prevent body fluid that contacts it from passing therethrough. The liquid
5 impermeable baffle 52 can be formed from a thin sheet of thermoplastic material such as polyethylene, polypropylene, polyvinyl chloride and the like. Alternatively, the liquid impermeable baffle 52 can be a non-woven, fibrous web that has been constructed to have low liquid permeability. The liquid impermeable baffle 52 can also be constructed from a foam material. In some instances, it may be advantageous to form the liquid
10 impermeable baffle 52 from a material that will allow vapor to pass through but which will prevent body fluid from passing through.

The absorbent layer 54 that is retained between the liquid-permeable cover 50 and the liquid impermeable baffle 52 should be primarily designed to absorb urine. However, it could be constructed to absorb other body fluids, such as menses, blood,
15 perspiration, as well as other body excrements. The absorbent layer 54 can be formed from various natural and/or synthetic materials, such as cellulose fibers, wood pulp fibers, regenerated cellulose or cotton fibers, meltblown fibers, a blend of pulp and other fibers, or a combination of various fibers. A suitable material is "coform" which is a mixture of cellulose fibers and synthetic polymer fibers. Coform is manufactured by Kimberly-Clark
20 Corporation having an office at 401 North Lake Street, Neenah, Wisconsin 54956.

The absorbent layer 54 can also include superabsorbent materials, commonly referred to as "superabsorbents", to increase its absorbency and ability to retain body fluids under pressure loads. The superabsorbents can be present in particle form, as flakes or have some other structural shape. The superabsorbents can be secured to the
25 absorbent fibers by an adhesive or they can be loosely positioned between the absorbent fibers. Suitable superabsorbents are commercially available from Dow Chemical Company, Hoechst Celanese Corporation and Allied Colloids, Inc.

The absorbent layer 54 may be wrapped in tissue or some similar kind of acquisition and/or distribution layer to assist in maintaining the integrity of the absorbent
30 fibers and the superabsorbents.

It should be noted that the absorbent pad 46 should be design to absorb at least about 100 grams of body fluid, such as urine. Preferably, the absorbent pad 46 should be design to absorb from between about 100 grams to about 1500 grams of body fluid. More preferably, the absorbent pad 46 should be design to absorb about 500 grams of body
35 fluid. Even more preferably, the absorbent pad 46 should be design to absorb about

1,000 grams of body fluid. Most preferably, the absorbent pad 46 should be design to absorb about 1,500 grams of body fluid.

A surge layer 58 can optionally be positioned above the absorbent layer 54 such that it is in direct contact with the liquid-permeable cover 50. The purpose of the surge layer 58 is to quickly take up body fluid that contacts the cover 50 and direct this body fluid downward toward the absorbent layer 54. In addition, the surge layer 58 can direct the body fluid outward in the transverse and longitudinal directions so that it is capable of contacting a greater surface area of the absorbent layer 54. This ability to quickly move the body fluid in the x, y and z directions diffuses surges of body fluid which insult the absorbent pad 46. The surge layer 58 is also commonly referred to as an acquisition/distribution layer. The surge layer 58 can be formed from a through-air bonded carded web composed of a blend of 40 percent 6 denier polyester fibers, commercially available from Hoechst Celanese corporation, and 60 percent 3 denier polypropylene/polyethylene sheath core bicomponent fibers, commercially available from Chisso Corporation. The surge layer 58 can have an overall basis weight ranging from about 50 grams per square meter (gsm) to about 120 gsm. In Fig. 1, the surge layer 58 is depicted as having a rectangular configuration but it could be formed into other shapes as well, including an hourglass shape, an oval shape, etc.

Referring to Figs. 1 and 4, the underpants 10 includes a first pair of leg elastics 60 secured between the outer cover 12 and the inner liner 20. The first pair of leg elastics 60 is present on the right and left sides of the front waist portion 26. Each of the first pair of leg elastics 60 is positioned adjacent to one of the pair of leg openings, 42 and 44 respectively. The first pair of leg elastics 60 is depicted as being three strands of an elastic material although a fewer or a greater number of strands can be utilized if desired. It has been found that three strands provide adequate elastic strength to form gathers about each of the leg openings 42 and 44. The first pair of leg elastics 60 can be secured at intermittent sites to the outer cover 12 and to the inner liner 20 by an adhesive, by ultrasonic bonding, by heat and/or pressure bonds or by some other means known to those skilled in the art. Materials suitable for forming the first pair of leg elastics 60 include polyurethane, rubber, and other elastomeric materials. The first pair of leg elastics 60 can be in the form of long or short elastic strands, elastic tapes, ribbons, yarns, etc. The first pair of leg elastics 60 can have a cross-sectional configuration that is flat, square, rectangular, circular, oval or some other shape. A good material from which the first pair of leg elastics 60 can be formed is LYCRA®. LYCRA® is a registered trademark of the E. I. DuPont de Nemours & Company that has an office at 1002 Market Street, Wilmington, Delaware 19801.

Each of the first pair of leg elastics 60 is positioned adjacent to a first pair of edges 62. Each of the first pair of edges 62 is substantially linear in configuration and each extends inward toward the crotch portion 18 from one of the two distally spaced edges 28 and 30. Preferably, at least about 70% of the length of each of the first pair of edges 62 are linear in configuration. Each of the first pair of edges 62 are aligned at an angle alpha (α) to the longitudinal centerline X—X of the underpants 10. The angle alpha (α) can range from between about 62 degrees to about 99 degrees. Preferably, the angle alpha (α) can range from between about 74 degrees to about 91 degrees, and most preferably, the angle alpha (α) is at least about 85 degrees. The angling of the first pair of edges 62 relative to the longitudinal centerline X—X ensures a better contouring of the underpants 10 to the body and provides a comfortable fit with reduced bunching.

The first pair of leg elastics 60 is located along and is preferably aligned parallel to the first pair of edges 62. Each of the first pair of leg elastics 60 has a first end 64 located adjacent to or coterminous to one of the distal edges, 28 and 30 respectively. Preferably, each of the first ends 64 is spaced slightly inward from one of the two distal edges 28 and 30. The first pair of leg elastics 60 should extend toward the absorbent pad 46 but should stop short thereof. Each of the first pair of leg elastics 60 terminates at a second end 66. Each second end 66 is located adjacent to the outer periphery of the absorbent pad 46. The exact distance can vary from between about 1 millimeter to about 50 millimeters, and preferably, the distance is less than about 25 millimeters.

The underpants 10 also include a second pair of leg elastics 68 secured between the outer cover 12 and the inner liner 20. The second pair of leg elastics 68 is present on the right and left sides of the back waist portions 32. Each of the second pair of leg elastics 68 is positioned adjacent to one of the pair of leg openings, 42 and 44 respectively. The second pair of leg elastics 68 is depicted as being three strands of an elastic material although a fewer or a greater number of strands can be utilized if desired. It has been found that three strands provide adequate elastic strength to form gathers about each of the leg openings 42 and 44. The second pair of leg elastics 68 can be secured at intermittent sites to the outer cover 12 and to the inner liner 20 by an adhesive, by ultrasonic bonding, by heat and/or pressure bonds or by some other means known to those skilled in the art. Materials suitable for forming the second pair of elastics 68 include those described above with reference to the first pair of leg elastics 60. Like the first pair of elastics 60, the second pair of leg elastics 68 can be in the form of long or short elastic strands, elastic tapes, ribbons, yarns, etc. The second pair of leg elastics 68 can have a cross-sectional configuration that is flat, square, rectangular, circular, oval or some other shape.

Each of the second pair of leg elastics 68 is positioned adjacent to a second pair of edges 70. Each of the second pair of edges 70 is substantially linear in configuration and extends inward toward the crotch portion 18 from the two distally spaced edges 34 and 36. Preferably, at least about 70% of the length of each of the second pair of edges 70 are linear in configuration. Each of the second pair of edges 70 are aligned at an angle beta (β) to the longitudinal centerline X—X of the underpants 10. The angle beta (β) can range from between about 45 degrees to about 89 degrees. Preferably, the angle beta (β) can range from between about 55 degrees to about 87 degrees, and most preferably, the angle beta (β) is from between about 61 degrees to about 76 degrees. The angling of the second pair of edges 70 relative to the longitudinal centerline X—X ensures a better contouring of the underpants 10 to the body and provides a comfortable fit with reduced bunching.

The second pair of leg elastics 68 is located along and preferably aligned parallel to the second pair of edges 70. Each of the second pair of leg elastics 68 has a first end 72 located adjacent to or coterminous to one of the distal edges, 34 and 36 respectively. Preferably, each of the first ends 72 is spaced slightly inward from one of the two edges 34 and 36. The second pair of leg elastics 68 should extend toward the absorbent pad 46 but should stop short thereof. Each of the second pair of leg elastics 68 terminates at a second end 74. Each second end 74 is located adjacent to the outer periphery of the absorbent pad 46. The exact distance can vary from between about 1 millimeter to about 50 millimeters, and preferably, the distance is less than about 25 millimeters.

The disposable absorbent underpants 10 further includes a third pair of leg elastics 76 secured between the liquid-permeable cover 50 and the liquid impermeable baffle 52 that form the absorbent pad 46. The third pair of leg elastics 76 is present on the right and left sides of the crotch portion 18. Each of the third pair of leg elastics 76 is positioned adjacent to one of the pair of leg openings, 42 and 44 respectively. The third pair of leg elastics 76 is depicted as being three strands of an elastic material although a fewer or a greater number of strands can be utilized if desired. It has been found that three strands provide adequate elastic strength to form gathers about each of the leg openings 42 and 44. The third pair of leg elastics 76 can be secured at intermittent sites to the liquid-permeable cover 50 and to the liquid impermeable baffle 52 by an adhesive, by ultrasonic bonding, by heat and/or pressure bonds or by some other means known to those skilled in the art. Materials suitable for forming the third pair of elastics 76 include those described above with reference to the first and second pairs of leg elastics, 60 and 68 respectively. Like the first and second pairs of leg elastics, 60 and 68 respectively, the third pair of leg elastics 76 can be in the form of long or short elastic strands, elastic tapes, ribbons, yarns,

etc. The third pair of leg elastics 76 can have a cross-sectional configuration that is flat, square, rectangular, circular, oval or some other shape.

Each of the third pair of leg elastics 76 is positioned adjacent to a third pair of edges 78. Each of the third pair of edges 78 has an arcuate or curved configuration and extends adjacent to the outside periphery of the crotch portion 18. Preferably, each of the third pair of leg elastics 76 is aligned parallel to one of the third pair of edges 78. Each of the third pair of leg elastics 76 is positioned intermediate one of the first and second pairs of leg elastics 60 and 68 respectively. Each of the third pair of leg elastics 76 has a first end 80 and a second end 82. The first end 80 of each of the third pair of leg elastics 76 is separated from the second end 66 of the first pair of leg elastics 60 by a first pair of gaps 84. The dimension of each of the first pair of gaps 84 is denoted as " D_1 " and D_1 can be at least about 0.125 inches (about 0.32 mm) in length. Preferably, the dimension D_1 of each of the first pair of gaps 84 is from between about 0.25 inches (about 0.64 mm) to about 9 inches (about 22.9 mm). More preferably, the dimension D_1 of each of the first pair of gaps 84 is from between about 0.375 inches (about 0.95 mm) to about 5 inches (about 12.7 mm). Most preferably, the dimension D_1 of each of the first pair of gaps 84 is from between about 0.5 inches (about 1.3 mm) to about 2 inches (about 5 mm). The dimension D_1 is measured when the underpants 10 are in a flat, extended orientation similar to that depicted in Figs. 1 and 5.

Likewise, the second end 82 of each of the third pair of leg elastics 76 is separated from the second end 74 of the second pair of leg elastics 68 by a distance " D_2 " by a second pair of gaps 86. The dimension of each of the second pair of gaps 86 is denoted as " D_2 " and D_2 can be at least about 0.125 inches (about 0.32 mm) in length. Preferably, the dimension D_2 of each of the second pair of gaps 86 is from between about 0.25 inches (about 0.64 mm) to about 9 inches (about 22.9 mm). More preferably, the dimension D_2 of each of the second pair of gaps 86 is from between about 0.375 inches (about 0.95 mm) to about 5 inches (about 12.7 mm). Most preferably, the dimension D_2 of each of the second pair of gaps 86 is from between about 0.5 inches (about 1.3 mm) to about 2 inches (about 5 mm). The dimension D_2 is measured when the underpants 10 are in a flat, extended orientation similar to that depicted in Figs. 1 and 5.

It should be noted that two pairs of gaps 84 and 86 have been described. However, if one desired to use only one pair of the two pairs of gaps, 84 and 86, that this can be done. One could also use additional gaps, if desired, without destroying the function of this invention. Preferably, the two pairs of gaps 84 and 86 will be utilized.

The first and second pairs of gaps, 84 and 86 respectively, ensures that the first, second and third pairs of leg elastics, 60, 68 and 76 respectively, will cooperate together

to form gathers 88 and 90 around the first and second leg openings, 42 and 44 respectively. The gathers 88 and 90, best depicted in Fig. 2, form a snug fit around the entire circumference of each leg opening 42 and 44. The two pairs of gaps 84 and 86 will prevent the adjacent leg elastics 60, 68 and 76 from overlapping one another and forming
5 bumps and/or humps around the leg openings 42 and 44. By eliminating such bumps and humps, one can prevent the leakage of body fluid through the leg openings 42 and 44. It is very important that fluid leakage from around the leg openings 42 and 44 be eliminated because if such leakage occurs, the usefulness of the underpants 10 is compromised.

Even though the two pairs of gaps 84 and 86 are present in the stretched out, flat
10 orientation shown in Figs. 1 and 5, the contraction force of the first, second and third pairs of leg elastics 60, 68 and 76 will cause the gathers 88 and 90 to form. The force of the elastics 60, 68 and 76 adjacent to the gaps 84 and 86 will cause the material forming the outer cover 12 and the inner liner 20 to fit snug against the thighs of the wearer during use. No fluid channels will occur at the locations of the first and second pairs of gaps 84
15 and 86. This will assure that no body fluid will be able to leak out through these locations (D_1 and D_2) during normal use.

Referring again to Figs. 1 and 2, the disposable absorbent underpants 10 further has waist elastic 92 attached to the front waist portion 26 and waist elastic 94 attached to the back waist portion 32. The waist elastics 92 and 94 can include threads, strands,
20 ribbons, bands, film, elastic non-wovens or composites. The threads, strands, ribbons, etc. may be a multitude of singular members or they may be applied as a composite. The number of elastic members can range from 1 to over a 100. Preferably, the number of elastic members will range from between about 10 to about 40, and most preferably, from about 15 to about 35. There can be an equal number or a different number of waist
25 elastics 92 in the front waist portion 26 versus the number of waist elastics 94 in the back waist portion 32. The waist elastics 92 and 94 can be individual threads that are spaced apart from one another from between about 0.063 inches (about 1.6 mm) to about 2.0 inches (about 51 mm). Preferably, the waist elastics 92 and 94 can be individual threads that are spaced apart from one another by about 0.25 inches (about 6 mm). While the
30 appearance of the underpants 10 may be enhanced by the close even spacing of the waist elastics 92 and 94, the exact distance between adjacent waist elastics 92 or 94 can vary.

The waist elastics 92 and 94 may be made from any suitable elastomeric material. One suitable material is LYCRA®. LYCRA® is a registered trademark of the E. I. DuPont
35 de Nemours & Company that has an office at 1002 Market Street, Wilmington, Delaware 19801. Suitable waist elastics 92 and 94 include threads having a decitex (grams/10,000

5 meters) of from between about 100 to about 1,200, preferably, from between about 470 to about 940, and most preferably, from between about 620 to about 740. The waist elastics 92 and 94 can be secured to the outer cover 12 and to the inner liner 20 by a hot or cold melt adhesive applied in a variety of spray patterns. One spray pattern that has been used with good success is a swirl pattern. A preferred adhesive is a hot melt adhesive sold as Findley H2096 by ATO Findley Adhesives having an office in Milwaukee, Wisconsin.

10 Referring to Figs. 5 and 6, an alternative embodiment of disposable absorbent underpants 10' is depicted. The numbers used in Fig. 1 will be reused to connote identical structure in Figs. 5 and 6. In this embodiment, the underpants 10' includes an inner liner 20' having a front portion 22' and a back portion 24' joined together by a crotch portion 25. In the underpants 10', the inner liner 20' can be a single piece of material or it could be assembled from two or more pieces of material. Preferably, the inner liner 20' will be a single piece of material. The crotch portion 25 can overlay the crotch portion 18 of the outer cover 12. The crotch portion 25 can be bonded to the crotch portion 18 of the outer cover 12 or it can merely be in contact therewith. Alternatively, the crotch portion 18 of the outer cover 12 can be eliminated when the crotch portion 25 of the inner liner 20' is present. When the inner liner 20' includes a crotch portion 25, the absorbent pad 46 can be secured thereto. One will notice that in Fig. 1, the inner liner 20 did not include a crotch portion and therefore, the absorbent pad 46 was secured directly to the crotch portion 18 of the outer cover 12. When the inner liner 20' does include a crotch portion 25, it is advantageous to secure the absorbent pad 46 directly to it.

20 In Figs. 5 and 6, just as in Fig. 1, the front and back portions, 22' and 24' respectively, of the inner liner 20' are attached to the front and back portions, 14 and 16 respectively, of the outer cover 12. The front and back waist portions, 26 and 32 respectively, are in turn seamed or sealed together to form the tubular configuration 38 depicted in Fig. 2.

30 While the invention has been described in conjunction with two specific embodiments, it is to be understood that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, this invention is intended to embrace all such alternatives, modifications and variations that fall within the spirit and scope of the appended claims.

We claim:

1. A disposable absorbent underpants for containing body fluid comprising:
 - a) an outer cover having a front portion and a back portion joined together by a crotch portion;
 - b) an inner liner attached to said outer cover, said inner liner having at least a front portion and a back portion, said front and back portions of said outer cover and said inner liner being connected together to form a waist opening and a pair of leg openings;
 - c) an absorbent pad secured to said crotch portion, said absorbent pad including a liquid-permeable cover, a liquid impermeable baffle and an absorbent layer positioned therebetween;
 - d) a first pair of leg elastics secured between said outer cover and said inner liner at said front portion, each of said first pair of leg elastics being positioned adjacent to one of said pair of leg openings;
 - e) a second pair of leg elastics secured between said outer cover and said inner liner at said back portion, each of said second pair of leg elastics being positioned adjacent to one of said pair of leg openings;
 - f) a third pair of leg elastics secured between said liquid-permeable cover and said liquid impermeable baffle, each of said third pair of leg elastics being positioned adjacent to one of said leg openings intermediate one of said first and second pairs of leg elastics, each of said third pair of leg elastics being separated from at least one of said first and second pairs of leg elastics by a gap, said first, second and third pairs of leg elastics allowing gathers to form about each of said leg openings to prevent leakage of body fluid from said underpants; and
 - g) waist elastic attached between said outer cover and said inner liner at said front and back portions, said waist elastics allowing gathers to form about said waist opening to prevent leakage of body fluid from said underpants
2. The disposable absorbent underpants of claim 1 wherein one of said third pair of leg elastics is separated from one of said first pair of leg elastics by a gap having a dimension of at least about 0.125 inches.

3. The disposable absorbent underpants of claim 1 wherein one of said third pair of leg elastics is separated from one of said second pair of leg elastics by a gap having a dimension of at least about 0.125 inches.

5 4. The disposable absorbent underpants of claim 1 wherein each of said third pair of leg elastics is separated from one of said first pair of leg elastics and from one of said second pair of leg elastics by a gap having a dimension of at least about 0.125 inches.

10 5. The disposable absorbent underpants of claim 1 wherein said gap has a dimension of from between about 0.25 inches to about 9 inches.

6. The disposable absorbent underpants of claim 5 wherein said gap has a dimension of from between about 0.375 inches to about 5 inches.

15 7. The disposable absorbent underpants of claim 5 wherein said gap has a dimension of from between about 0.5 inches to about 2 inches.

8. The disposable absorbent underpants of claim 1 wherein said absorbent pad has a capacity for absorbing about 500 grams of body fluid.

20 9. The disposable absorbent underpants of claim 8 wherein said absorbent pad has a capacity for absorbing about 1,000 grams of body fluid.

10. A disposable absorbent underpants for containing body fluid comprising:

- 25 a) an outer cover having a front portion and a back portion joined together by a crotch portion;
- b) an inner liner having a front portion and a back portion joined together by a crotch portion, said front and back portions of said inner liner being attached to said front and back portions of said outer cover to form a waist opening and a pair of leg openings;
- 30 c) an absorbent pad secured to said crotch portion of said inner liner and having a capacity for absorbing at least about 100 grams of body fluid, said absorbent pad including a liquid-permeable cover, a liquid impermeable baffle and an absorbent layer positioned therebetween;

- 5
- d) a first pair of leg elastics secured between said outer cover and said inner liner at said front portion, each of said first pair of leg elastics being positioned adjacent to one of said pair of leg openings;
- e) a second pair of leg elastics secured between said outer cover and said inner liner at said back portion, each of said second pair of leg elastics being positioned adjacent to one of said pair of leg openings;
- 10
- f) a third pair of leg elastics secured between said liquid-permeable cover and said liquid impermeable baffle, each of said third pair of leg elastics being positioned adjacent to one of said leg openings intermediate one of said first and second pairs of leg elastics, each of said third pair of leg elastics being separated from at least one of said first and second pairs of leg elastics by a gap, said first, second and third pairs of leg elastics allowing gathers to form about each of said leg openings to prevent leakage of body fluid from said underpants; and
- 15
- g) waist elastic attached between said outer cover and said inner liner at said front and back portions, said waist elastics allowing gathers to form about said waist opening to prevent leakage of body fluid from said underpants.

20

11. The disposable absorbent underpants of claim 10 wherein each of said third pair of leg elastics is separated from each of said first pair of leg elastics by a gap having a dimension of at least about 0.125 inches.

25

12. The disposable absorbent underpants of claim 10 wherein each of said third pair of leg elastics is separated from each of said second pair of leg elastics by a gap having a dimension of at least about 0.125 inches.

30

13. The disposable absorbent underpants of claim 10 wherein each of said third pair of leg elastics is separated from one of said first pair of leg elastics and from one of said second pair of leg elastics by a gap having a dimension of at least about 0.125 inches.

14. The disposable absorbent underpants of claim 10 wherein said absorbent pad has a capacity for absorbing about 500 grams of body fluid.

15. A disposable absorbent underpants for containing body fluid comprising:

- 35
- a) an outer cover having a front portion and a back portion joined together by a crotch portion;

- b) an inner liner attached to said outer cover, said inner liner having at least a front portion and a back portion, said front and back portions of said outer cover and said inner liner being connected together to form a waist opening and a pair of leg openings;
- 5 c) an absorbent pad positioned over said crotch portion and having a capacity for absorbing at least about 100 grams of body fluid, said absorbent pad including a liquid-permeable cover, a liquid impermeable baffle, and a surge layer and an absorbent layer positioned between said liquid-permeable cover and said liquid impermeable baffle, said liquid impermeable baffle being secured to said crotch portion by an adhesive;
- 10 d) a first pair of leg elastics secured between said front portion of said outer cover and said inner liner, each of said first pair of leg elastics being positioned adjacent to one of said pair of leg openings;
- e) a second pair of leg elastics secured between said back portion of said outer cover and said inner liner, each of said second pair of leg elastics being positioned adjacent to one of said pair of leg openings;
- 15 f) a third pair of leg elastics secured between said liquid-permeable cover and said liquid impermeable baffle, each of said third pair of leg elastics being positioned adjacent to one of said leg openings intermediate one of said first and second pairs of leg elastics, each of said third pair of leg elastics being separated from at least one of said first and second pairs of leg elastics by a gap having a dimension of at least about 0.125 inches, said first, second and third pairs of leg elastics allowing gathers to form about each of said leg openings to prevent leakage of body fluid from said underpants; and
- 20 g) waist elastic attached to said front and back portions between said outer cover and said inner liner, said waist elastics allowing gathers to form about said waist opening to prevent leakage of body fluid from said underpants.
- 25

16. The disposable absorbent underpants of claim 15 wherein said absorbent pad has a capacity for absorbing about 500 grams of body fluid.

30

17. The disposable absorbent underpants of claim 16 wherein said absorbent pad has a capacity for absorbing about 1,000 grams of body fluid.

18. The disposable absorbent underpants of claim 17 wherein said absorbent pad has a capacity for absorbing about 1,500 grams of body fluid.

35

19. The disposable absorbent underpants of claim 15 wherein said crotch portion has a width and said absorbent pad has a width which is at least about 0.125 inches less than the width of said crotch portion.
- 5 20. The disposable absorbent underpants of claim 15 wherein said absorbent pad has a width and said absorbent layer has a width which is at least about 0.125 inches less than the width of said absorbent pad.

1/4

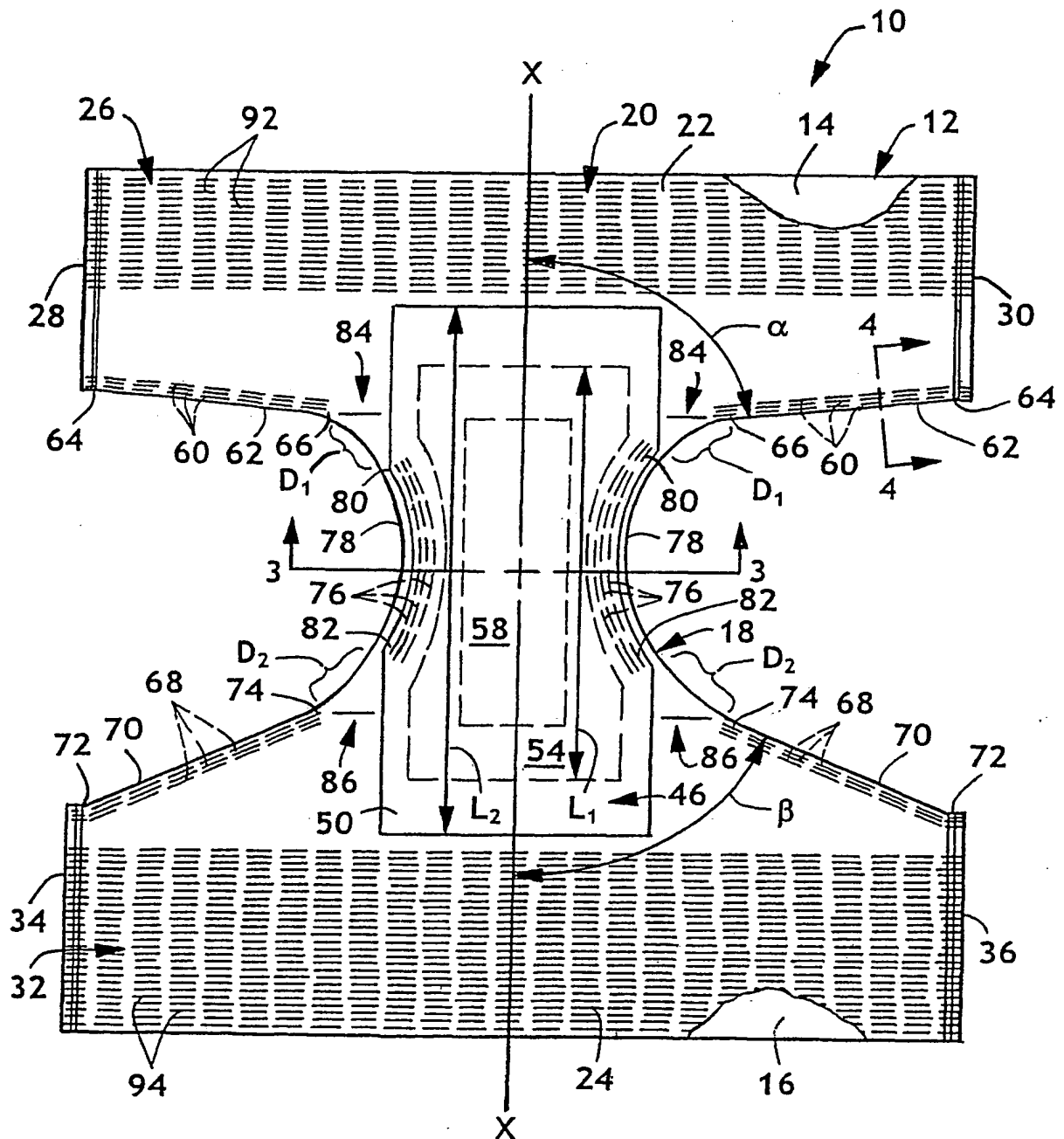


FIG. 1

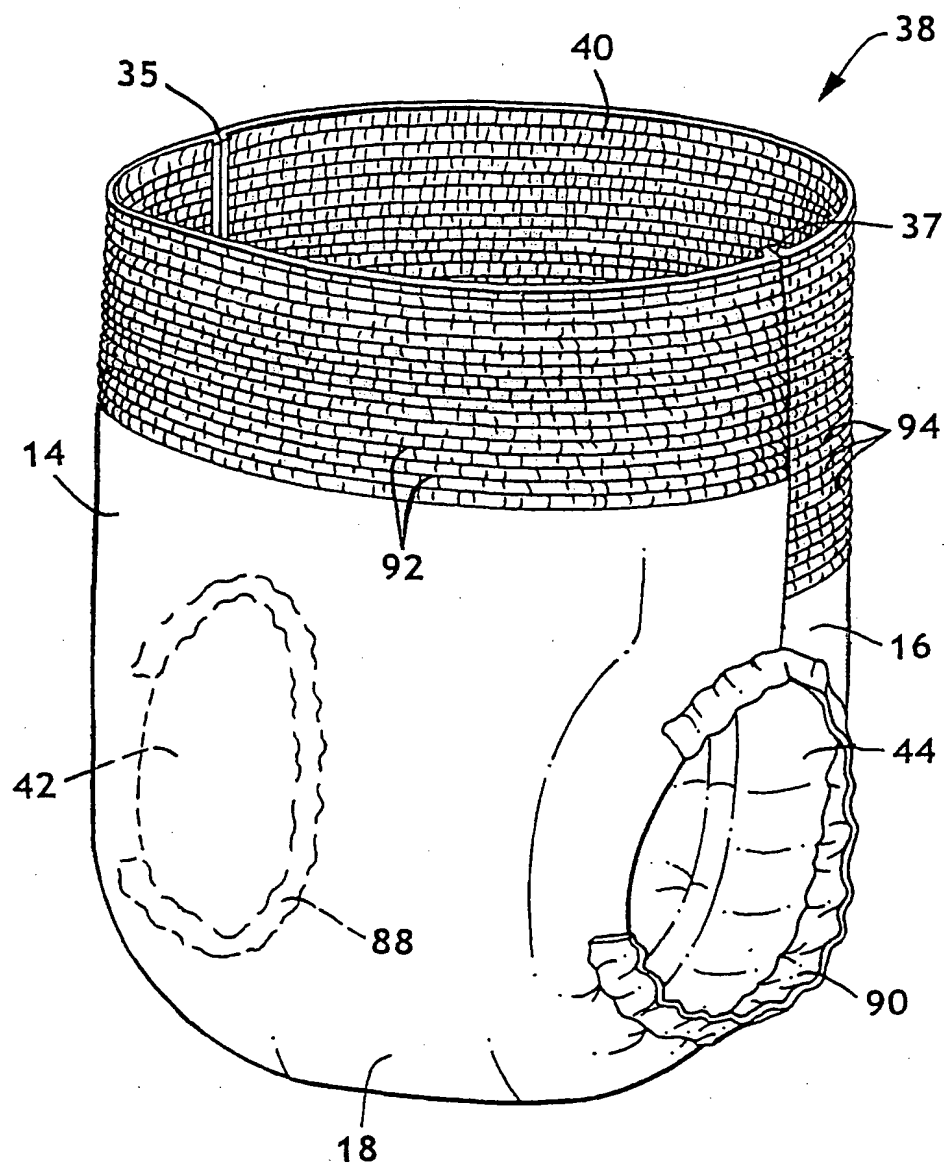


FIG. 2

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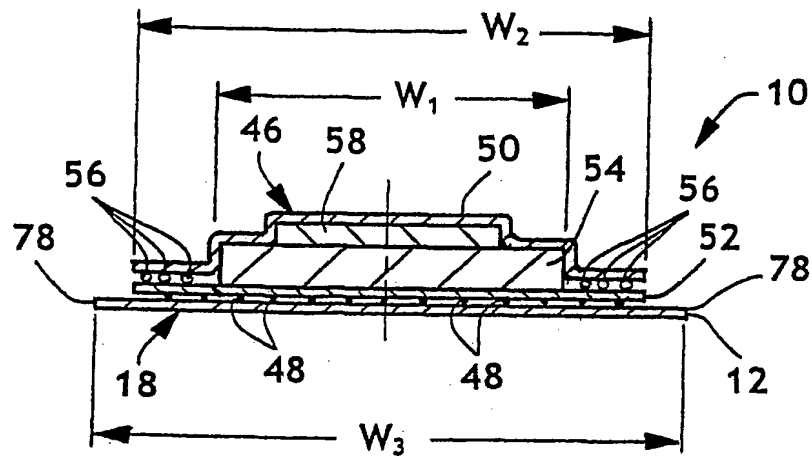


FIG. 3

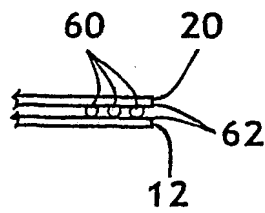


FIG. 4

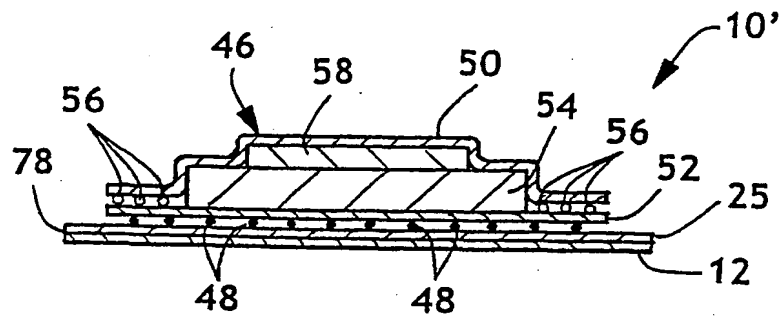


FIG. 6

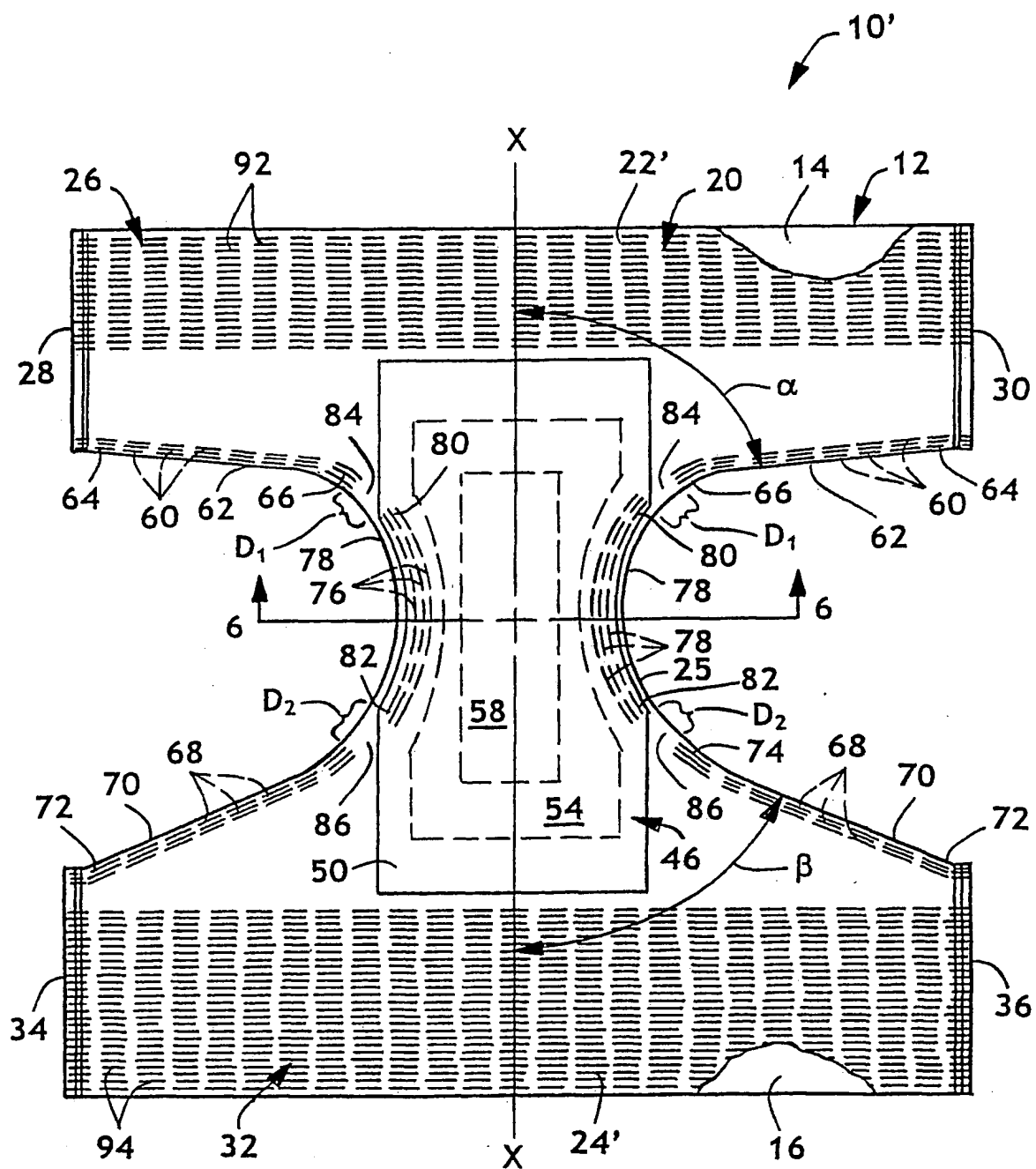


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/13460

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61F13/494 A61F13/496 A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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P,X	EP 1 027 874 A (FIRST QUALITY ENTERPRISES INC) 16 August 2000 (2000-08-16) column 5, line 27 - line 45 figures 1-4	1,10,15
X	WO 99 25296 A (KIMBERLY CLARK CO) 27 May 1999 (1999-05-27) page 2, line 1 - line 17 page 5, line 13 - line 20 page 7, line 1 - page 10, line 14 page 14, line 4 - page 18, line 28 page 23, line 23 - page 25, line 8 figures 1A-9	1-20
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-/-

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

27 September 2001

Date of mailing of the international search report

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

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INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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